

SOME CEYLON COCCIDAE.

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All the species of scale-insects described in this paper were found at Peradeniya, Ceylon.

***Aulacaspis flacourtiæ*, sp. nov.**

Female scale indistinguishable from that of *Aulacaspis pentagona*.

Male scale white, uncarinated, clustered, standing out from the twigs often quite at a right angle.

Adult female almost circular, white, with pygidium yellowish-brown and segments in front of pygidium with lateral expansions which bear plates. The anterior stigmata with a group of parastigmatic glands, posterior spiracles without such glands. Median lobes alone well developed; not sunk in a cleft, prominent, triangular, rounded at apex and but slightly serrated. Each lobe projects mesally into the pygidium and there is a similar projection between them. The other lobes and pore-projections are represented by mere chitinisations of the pygidium; the second lobe may be slightly developed. Spines (setae) and plates as in *A. pentagona*, except that there may be 4 or 5 or even 6 immediately laterad of the second pair of pore-projections; the plates mesad of this group are comparatively short, broad and blunt at apex. The dorsal pores on the pygidium are arranged in two broken arches that reach the margin of the pygidium at the third and fourth pairs of pore-projections; there are no pores immediately laterad of the circumgenital pores. The abdominal segments bear numerous dorsal pores laterally, grouped on the anterior as well as the posterior region of the segment. Circumgenital pores are very numerous and arranged in grape-like clusters. One count gave 76 median, 51 cephalo-lateral, and 40 and 50 caudo-lateral; another had 54 in the median group. There is a band of chitin on the mesal margin of the lateral groups of pores, and two transverse bars cephalad of the median group.

Adult male agrees with Green's description of the male of *D. amygdali* (*Aulacaspis pentagona*), except that the terminal segment of the antenna is considerably shorter than the preceding segment, and that the tarsal claw is broader at the base than in Green's figure. First exuvium (of ♂) with antennae large and 5-segmented, and situated on the anterior margin; the terminal segment bearing numerous setae. Meso-caudad of the base of the antennae are two trumpet-shaped glands, these doubtless secreting filaments as in the pale larvae of *A. pentagona* (*vide* Green, Coccidae of Ceylon, i, p. 88). The abdomen is distinctly segmented, there being seven segments; the apex of the abdomen is slightly concave and bears two long hair-like spines each associated with a comparatively large gland. Some show a distinct caudal notch with a short, stout spine on each side of the notch.

Eggs yellow or white.

This insect occurs along with *Howardia biclavis* on the twigs and branches of *Flacourtia ramontchii* and is doubtless the insect referred to by Green as "typical *Diaspis pentagona*" (Memoirs, Dept. Agr. India, i, no. 5, p. 346).

It seems sufficiently distinct to warrant its being considered a separate species. The number of circumgenital glands is much in excess of anything I have seen recorded for *A. pentagona*, for which Green gives (12-25) (30-46) (28-38); the plates, too, are more numerous.

The insect is preyed on by a small, light-brown Coccinellid with a *Pseudococcus*-like larva, and less so by *Chilochorus circumdatus*, and is parasitised by a small, black Chalcid.

Aulacaspis myristicae, sp. nov.

Secretion of female scale coarse, white or brown—the latter colour being due to a covering of hairs of the plant—oval in outline and enclosing the second exuvium; exuviae reddish-brown. Adult female pear-shaped; the median lobes set in a slight notch, short, narrowed at base, expanded disto-laterally and broadly rounded at apex. The second lobe is duplex; the lateral half is conspicuous and distinctly rounded at apex and is of much the same shape as the mesal half. In *Diaspis barberi*, Gr., which this insect somewhat resembles, the outer lobe of the first lateral lobe is said to be "very small, conical" (Mem. Dept. Agr. Ind., ii, no. 2). Laterad of the second lobe is a very prominent gland-pore and laterad of this a faintly chitinised, bi-lobed projection, each part serrated on the margin. Where the two rows of dorsal pores meet the margin the pygidium bears conspicuous projections. There is a group of 19 or 20 parastigmatic glands associated with the anterior spiracles; the posterior spiracles are without such glands. There are no dorsal pores immediately laterad of the circumgenital pores. (Such pores are figured as present in *D. barberi*, Gr., and *D. fagraeae*, Gr.). The abdominal segments in front of the pygidium bear numerous dorsal pores. The circumgenital pores are in five grape-like groups. Four individuals showed pores as follows:—17 (37 and 34) (36 and 56, these 56 somewhat scattered); 14 (32 and 28) (30 and 32); 17 (32 and 34) (26 and 30); 15 (32 and 34) (32 and 34). There are two plate-like projections associated with the pore laterad of the median lobes; other plates 1, 2-3, 4-8, 9-11.

On midrib of leaf of *Myristica laurifolia* (Wild Nutmeg), 15. vii. 1913.

This insect resembles somewhat *D. fagraeae*, Gr., but the plates in the fourth space are more numerous, the circumgenital pores are more numerous, *D. fagraeae* having (8-10) (15-18) (20-30), and the median lobes are of a different shape.

As compared with *D. barberi*, Gr., the median lobes are not expanded distally on both sides, but only laterally, they are not slightly incised, and the circumgenital pores and the plates are more numerous, *D. barberi* having pores as follows:—(6-9) (18-23) (19-23).

Pseudoonidia oreodoxae, sp. nov.

The scale is partly concealed underneath the bark of the tree. The secretion is dark-brown, the exuviae orange; leaves a white ventral scale.

Adult female dark purple, flat on the venter, convex dorsally. There are two smooth shining areas at the base of the abdomen on the venter, one on each side. There is a slight constriction one segment caudad and another five segments caudad of the main constriction. The median lobes are the largest and are usually broadly rounded; they may be slightly notched on the mesal and lateral sides. The second

and third lobes are smaller and very similar to each other in shape, the second being the larger; each is rounded at apex, bears a prominent notch on the lateral side, and is slightly inclined towards the apex of the pygidium. Laterad of the third lobes there are several sharp-pointed processes on the pygidial margin. There are six club-shaped paraphyses resembling those in *Aspidiotus maleollus*, Gr., to which this insect bears some resemblance; the body, however, is not hammer-shaped, nor are there any circumgenital pores; the body contains larvae. The pairs of paraphyses laterad of the third lobes is inconspicuous. Between the median lobes there is a distinct chitinised area of the pygidium. The plates are inconspicuous; there is a short plate laterad of the median lobes and one or two laterad of the second lobe. Bands of minute pores run cephalad from the margin of the pygidium. Long setae are arranged as follows:—0, 2, 2, 2, 2, increasing in length cephalad.

On stem of Cabbage Palm (*Oreodoxa oleracea*); also on Royal Palm (*Acalypha* sp.) and *Broussonetia papyrifera*, Vent.

On *Broussonetia* the scales have the exuviae yellowish-brown or yellowish-green in colour.*

This insect falls near to *Pseudaonidia tesserata*, de Ch., but the lobes are very different from those figured by Newstead in this *Bulletin* (iv, p. 309). It is without the plate-like process which Newstead figures laterad of the third lobes, having two setae in this position.

***Pseudaonidia irrepta*, sp. nov.**

Scale completely concealed underneath bark of plant. Adult ♀ slightly longer than broad, cephalic extremity flattened, caudal pointed. Metathorax and first and second abdominal segments distinctly produced laterally.

Female on slide about 2 mm. long. Median lobes large, rounded at apex, with a distinct notch on the lateral side. The second and third lobes are much smaller, but distinct, rounded on mesal side and at apex, prominently notched on lateral side; the notch may be absent in the case of the second lobe. Pygidial margin laterad of the third lobes with numerous prominent tooth-like processes. Two pairs of paraphyses, a long pair between first and second lobes, and a pair of about half the length between the second and third lobes. The apex of each paraphysis is a round knob which stands out the more prominently because the region immediately caudad of it is more feebly chitinised. A long seta and two short plates between the second and third lobes, and between the third lobe and the first tooth-like process; a seta between first and second, and another between second and third teeth. Anterior spiracles with about 11 parastigmatic pores; posterior spiracles without such pores. Anus narrow. Circumgenital pores in an arch round the vagina.

On branches of an undetermined plant (possibly *Acalypha* sp.).

The insect is attacked by Hymenopterous parasites, whose exit holes are often the only indication of the presence of the scale-insect. This species falls near *P. clavigera*, Ckll., but the latter has three pairs of paraphyses.

* I have specimens of this insect also from Cuba, and in these the parastigmatic glands number from ten to eleven. The unborn young have a prominent pair of lobes, each with two notches on the mesal and three on the lateral obliquity near the apex of the lobe.

Aonidiella pothi, sp. nov.

Female scale of a very dark brown colour and shining. The first exuvium has a reddish tinge. The whole scale is slightly elongated, with the exuviae towards one end. When removed a faint white ventral scale is left. A pair of short club-shaped paraphyses between the first and second lobes, and similar paraphyses more or less distinct between second and third, and third and fourth lobes. Between these and cephalad of the median lobes there is a chitinous knob. The antenna consists of a tubercle bearing a long seta. The median lobes are somewhat triangular in shape, with a distinct point at apex mesally, sometimes an apical notch, a notch on the lateral margin near apex and on the mesal margin near the base. The second lobes are narrower than the median, longer than broad, convergent caudally, pointed or rounded at apex, with the lateral margin distinctly notched. The third lobes are as broad as long, divergent caudally, notched on both sides, rounded at apex; the mesal notch is sometimes indistinct. The fourth and fifth lobes are more or less distinct, triangular, serrated, the pygidium in the interval between them also being serrated. There are two pectinae between the median lobes, two between first and second lobes, three between second and third lobes, three between third and fourth lobes; all are shortly three- or four-pronged at apex. There is a seta laterad of the mesal lobes; two laterad of second lobes, one being on base of lobe; two laterad of third lobes, one being on the lobe; two laterad of fourth lobe, one being on the lobe; and three on the margin of the pygidium cephalad of fourth lobe. The anus is longer than broad. There are no circumgenital pores. Plates of chitin serrated on the caudal edge surround the anterior margin of the vagina, giving a faint tessellated appearance.

The insects contain larvae with antennae, legs, mouth-parts and pygidial lobes well developed; the lobes are two in number, conspicuous, produced into the pygidium, converging caudally, rounded at apex, with one notch on the mesal and two on the lateral side.

The antennae distad of the fourth segment are ringed and end somewhat abruptly.

On *Pothos scandens*, chiefly at the nodes under the bud scales; also on *Loranthus* sp.

This insect falls near *Aspidiotus glomeratus*, Gr., from which, however, it is quite distinct.

Hemichionaspis alatae, sp. nov.

Female scale very inconspicuous, about 3 mm. long, of a dull, pale brown colour. The exuviae are situated at one end and are of much the same colour as the rest of the scale. The secretion is comparatively broad. The second exuvium has a slight but distinct median longitudinal ridge.

Male scale white, tricarinate, in dense clusters and lying flat on the twigs.

The median lobes of the adult female are large, extending slightly caudad of second lobes, the lateral edges sloping away to the pygidium and with three or four distinct notches. The second lobes are duplex, feebly chitinised but distinct, each half expanded towards the apex. Third lobe sometimes developed, duplex, mesal half longer than broad, lateral broader than long, both serrated on margin.

Between the first and second lobes there is a very prominent gland-pore projection, distinctly longer than broad, and sometimes projecting further caudad than the second lobe. The gland-pore projections laterad of the second lobes are also conspicuous. Plates 1 (small), 1, 1, 1 or 2, 3. There is a small seta at the base of the median lobes, and a larger seta laterad of them; two setae connected with the second lobe, and two, one of which is small, connected with the third lobe; one laterad of the two gland-pore projections beyond the third plate. Dorsal pores few but large and oval. Circumgenital pores (8-10) (20-23) (17-23).

Adult ♂ orange-red, with whitish wings; tarsus shorter than tibia and with two digitules; a single hair at the apex of the antenna.

On branches of *Carsia alata*.

It is subject to the attack of Hymenopterous parasites and is preyed on by Coccinellid larvae.

This insect is near *H. minor*, Mask., and may be a variety of that insect. *H. minor*, however, has "female puparium white" (Maskell; Cooley), "opaque snowy white, often specked with brown" (Green—*Ch. albizziae*, Gr.). Further, the lateral lobes of *H. minor* are ordinarily less well developed. It may be merely a variety of *H. aspidistrae*, Sign., which seems to be a very variable insect.

Chionaspis malloti, sp. nov.

Female scale more or less circular, convex, covered with hairs from the food-plant. Exuviae eccentric, covered with secretion; when rubbed are seen to be of a light orange-yellow colour. When the scale is removed a white mark is left on the twig. No exuviae are to be seen from the ventral surface, being hidden under a covering of white wax.

Male scale not observed.

The insect when treated with KOH and mounted on a slide is slightly longer than broad, rounded anteriorly and bluntly pointed posteriorly. There is but one lobe, evidently formed by the fusion of two. This lobe is very prominent, broader than long, with the sides parallel at base, afterwards converging, giving a somewhat triangular shape to the lobe; rounded at apex, with a short median basal prolongation into the pygidium; with two large setae on the lobe and a small seta immediately laterad of the lobe on each side. Laterad of median lobe is a short, heavily chitinised incision, the two sides of the incision being fused. Laterad of this are two large setae and a cluster of some eleven long plates. Laterad of this a second incision with a minute pointed hyaline lobe and a group of two long setae and some twelve long plates. Laterad of this a third incision and a group of two setae and some eleven plates. Cephalad of this are four groups of similar plates decreasing in size towards the anterior end. Circumgenital pores in five groups and very numerous, at least 100 in the median group; they are situated in groups as in the genus *Aulacaspis*. Cephalad, mesad and caudad of the circumgenital pores the pygidium is more heavily chitinised. Numerous dorsal pores immediately cephalad of third and fourth groups of plates. Antennae widely separated, consisting of two long spines on a low spinous tubercle. Anterior and posterior spiracles with numerous glands.

On twigs of *Mallotus philippinensis*, causing slight swellings, 7. vii. 1914.

In the groups of plates this insect resembles *A. cucullus*, Gr. It also has affinities with *Morganella maskelli*, but differs from both in the presence of circumgenital pores, and in the median lobes being fused. On the whole, however, I think it is more nearly allied to *Howardia biclavis*, Comst.

Lepidosaphes erythrinae, sp. nov.

Female scale about 2 mm. long; exuviae at one end golden-brown; secretion very dark brown.

Male scale similar, but smaller; white in region of "hinge" and often caudad of "hinge."

Adult elongated; cephalothorax large, sides straight, tapering slightly towards the anterior end, which is rounded. Antenna consisting of a tubercle bearing 1 or 2 long setae; in one case one of the setae is deeply forked. Anterior spiracles with 1 or 2 parastigmatic glands, posterior one without such glands. A single pair of lobes, resembling somewhat in shape the lobes of *Howardia biclavis*, Comst.; they are prominent, somewhat triangular in shape, but not symmetrically so, the apex being much nearer to the mesal side; the mesal margin is slightly curved, with a notch near the apex; the lateral margin straight, minutely but distinctly serrated. A large triangular chitinous area extends into the pygidium from the base of each lobe. The other lobes are rudimentary, being represented by small serrated projections. Between the median lobes, a pair of plates, a pair of setae, and a small spinous process. There is also a small seta on the base of the median lobes. Laterad of the median lobes in the following order:—a plate; a gland-pore, with a short spine-like extension; two setae, the mesal one of which is situated over the serrated projection which occupies the position of second lobe; two long plates, the lateral one of which is associated with a gland pore; a gland pore; a seta; two long plates with a seta between them; two gland pores; a seta; two plates with a seta between them; one gland pore. The marginal pores are long and narrow. The segments in front of the pygidium bear two or three plates on their margins. The anus is situated cephalad of the median group of circumgenital pores. Circumgenital pores of two individuals: 4 (in a row), (6 and 6) (4 and 4); another specimen had (3) (6 and 5) (2 and 4). Dorsal pores small, in two bands on each side of pygidium, the mesal band being mesad of the lateral groups of circumgenital pores. The median lobes of the second exuvium are distinct and of the same shape as those of the adult.

On bark of *Erythrina* sp.

I know of no species of *Lepidosaphes* with which this insect can be confounded.

Lepidosaphes ambigua, n. sp.

Scale not observed. It had been blown away and the insects were left adhering to the twig. Adult insect several times as long as broad. Segments in front of the pygidium laterally distinct. Pygidium with prominent marginal pores. Body tapering cephalad to a blunt point. A short, triangular process projects on each side of the head cephalad of the mouth-parts, and the margin is there slightly bulged out. A pair of apically diverging plates between the median lobes. The marginal

pores are in pairs and open in an extension of the pygidial margin; they are elongate oval in shape. Circumgenital pores present. Pygidium with two pairs of lobes. The median lobes are separate, but close to each other, somewhat triangular in shape, but with the apex nearer to the mesal side. The mesal and lateral sides form an unbroken curve with the apex. The lateral side slopes towards the pygidium, turning sharply cephalad near the base; their margin is not notched. Laterad of the median lobes:—a seta; a plate; a triangular gland-pore projection, reaching as far caudad as does the second lobe; second pair of lobes, the mesal half of which is almost as large as the median lobe and of much the same shape, the lateral half being about half as broad, much shorter and rectangular in shape; a seta; two long plates; two gland pores; one seta; two plates; two gland pores; one seta; two plates; one gland pore.

On twigs of *Mesua ferrea*.

What may be the male scale of this insect occurs on the under surface of the leaves close to the midrib. The exuvium is yellowish at the pygidial end, the rest of the scale being greyish-white and uncarinated. The lobes of the exuvium are large, triangular, rounded at apex and projecting into the pygidium. Laterad of each lobe are two setae and a long plate, broad at its base and tapering rapidly towards the apex. Antenna with six segments.

Aonidia ferreae, sp. nov.

Female scale very black, shining. The first exuvium is situated usually just within the margin, sometimes more centrally, and is black with the apex yellowish; it is raised in the centre and striated. The rest of the scale consists of the second exuvium. The venter of the scale is white, and when the scale is removed a white deposit of wax is left on the twig.

It is a very difficult matter to obtain the adult female, owing to the fact that it is quite enclosed. The pygidium is hyaline, without lobes and provided with a fringe of about 24 long pectinae. The anus is situated about three times its own length from the margin of the pygidium. There are no circumgenital pores. The anus and vagina are superimposed. The female contains young with legs, lobes and mouth-parts well developed. The apex of the second exuvium bears three pairs of lobes, each longer than broad. The median pair is widest at the middle length. The median and second lobes have each a notch on the lateral side, the third has two notches or is minutely toothed; the median lobes may have a slight notch on the mesal side as well. There are two pectinae between the median lobes, two between median and second lobes, and three between the second and third lobes; the apices of the pectinae are on a level with the apices of the lobes and are frayed at the apex. Laterad of the third lobes are three pectinae followed by an acute lobe-like projection. The interlobular incisions are deep.

On twigs of *Mesua ferrea*.

Neolecanium cinnamomi, sp. nov.

Old scales dark brown in colour, younger scales greyish-brown and very inconspicuous against the bark of the branches on which they occur. The younger scale has a slight whitish mid-dorsal longitudinal ridge, and a submarginal wavy white

ridge, from which short whitish ridges run to the margin. Dorsal surface covered with a thin granular wax. Anal plates dark brown.

Broadly-oval in shape; length 4.75 mm., breadth 3.75 mm. Antennae 8-jointed; apex of fifth and segments distal of fifth much wrinkled; apical segment bearing a very long seta on the tip and three or four long hairs proximad of apex; the first, second, fifth, sixth and seventh also with setae, third and fourth without. Legs well developed, tibia longer than tarsus. Anal plates with straight mesal side, outer side an unbroken curve; and opening surrounded by a heavily chitinised band. Margin with a close-set series of stout, sharp setae; practically no stigmal notch; stigmatic seta longer and more gradually tapering than other setae; scattered parastigmatic pores between stigmal spine and the stigma. The derm is crowded with oval translucent areas, a small circular pore being associated with each; scattered among them are several circular highly chitinised pores. Anal ring to all appearance with ten long setae.

Insects recently settled down are elongated, whitish and highly granular, bearing two brown longitudinal bands enclosing a whitish area.

On bark of branches of Cinnamon, July 1914.

This insect is obviously closely related to Green's *Neolecanium crustuliforme*, from which it differs in its appearance, in its larger size and in the number of the antennal segments.

Parlatoria mesuae, sp. nov.

Female scale about 1 mm. long, long and narrow, black. The second exuvium is about twice as long as the first. A slight, white, marginal secretion. Ventral scale more or less complete, incomplete at posterior end.

The adult insect is long and narrow. The antennae consist of a tubercle, one or two short spines and a long straight or curved seta. No parastigmatic pores. No circumgenital pores. Apex of the pygidium occupied by a broad pore situated at the base of a deep notch and bounded on each side by a broad bi-lobed lobe-like pectina. Laterad of this is a hyaline lobe, notched on the lateral margin, and followed by a broad pore with bordering pectinae similar to those of the median pore. These follow two pectinae, a pore similar to the preceding pores, and cephalad of this several low serrated projections and two smaller pores. The pectinae end abruptly and their fringe is very short and ragged. A row of short triangular spines and small circular pores along the margin of the body, in some cases apparently absent cephalad of the level of the mouth-parts. Anus situated near the base of the pygidium. The body may contain young insects with well-developed legs, antennae and mouth-parts. The first exuvium has at least one pair of lobes; these are triangular, and well separated; at the base of each on the mesal side is a long seta directed cephalad. Laterad of these lobes a duplex lobe and several projections of the pygidium. Antenna five-segmented. Terminal segment with numerous transverse striae and several long setae. The second exuvium has two pair of hyaline lobes, each lobe much longer than broad, and notched on both margins and rounded at apex. The marginal pores are situated in deep, semicircular incisions, strongly chitinised on the margin; one between first and second lobes, one between second and third, and one between the sixth and seventh pectinae beyond the second lobes.

Two pectinae between the median lobes, two between median and second lobes, and about eight laterad of second lobes; groups of 3, 2, 2, 2 on margin cephalad of these. The pectinae are somewhat indefinite in shape, but some are distinctly two-pronged at the apex and chitinised on each side at the base.

On the edges of the leaves of *Mesua ferrea*; very inconspicuous.

When mounted the insect and exuviae are not infrequently folded longitudinally, so that the structure of the pygidium is difficult to make out.

In the broad, lobe-like pectinae that form the boundary of the notch containing the pore the insect bears a strong resemblance to species of *Fiorinia*. The puparium, however, is not quite closed and the broad, marginal pores suggest a relationship to the genus *Parlatoria*.

Ceronema koebeli, Gr.

I found what are probably insects of this species on the twigs of *Pithecolobium saman* at Peradeniya in June. The male scales are very conspicuous, being white, with the purplish insect shining through. Males were emerging. The costal vein stands out as a prominent band near the costal margin of the wing and stops abruptly before the apex; it looked dark brown in colour rather than "deep red" (Green). The male puparium is composed of 14 plates.

The males were observed in the act of copulation. The copulatory organ, which is curved, is inserted between the anal plates. During copulation the antennae are vibrated slightly and the female is patted with the first pair of legs. The male has some difficulty in orienting himself properly and seems to be guided at least partly by a tactile sense in the copulatory organ. The female at the time of fertilisation is flat and inconspicuous, owing to the fact that the underlying bark shows through. She is white or pinkish-white, and the white of the spiracular grooves is clearly visible. There is a median, dorsal, longitudinal rounded ridge, while the rest of the surface is corrugated. The eyes are black and are situated well caudad of the anterior margin. The insects are considerably longer than broad, oval and blunt at both ends. The anal plates are brownish or black. In this stage the labial curve of the anal plate is not waved as in Green's figure of the adult.

Adult insects were also present with eggs and larvae. The eggs are white or orange, the larvae white or reddish white with crimson spots.

The part of the dorsum that becomes denuded of wax in old specimens is the region of the anal scales; it is black and shining and the anal scales are very small.

The antenna in the specimens examined has eight segments, of which the third is the longest. The fifth segment bears a long slender hair which reaches well towards the distal end of the seventh segment. The polygonal cells of the derm look oval when the specimen has been subjected to prolonged boiling in KOH. The stigmatic spines are nine or ten in number. There seem to be ten setae on the anal ring, one or two of which, however, are slender.

The insect is subject to the attack of Hymenopterous parasites. As many as four exit holes were observed in one scale. Emergence had taken place before the test had been fully developed.

The caterpillars of *Spalgis epius* were feeding inside the ovisac. They are of a dark green colour, bear tufts of hair, and are coated with the eggs, white wax, etc., of the scale.

There are four pairs of abdominal and a pair of anal forelegs ; the hooks are situated in a longitudinal row on the mesal side.
